

First record of *Aphelenchoides besseyi* Christie, 1942 (Nematoda: Aphelenchoididae) in Egypt causing white tip leaf disease on rice

By

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Abstract. A survey of plant parasitic nematodes in the paddies of some governorates in the Nile Delta revealed the presence of *Aphelenchoides besseyi* for the first time in Egypt. The nematode causes „white tip“ leaf disease symptoms on the rice leaves which become necrotic followed by reduction in size of the panicle and in size and number of the grains. Morphologically, the Egyptian population well corresponds to the classic descriptions of *A. besseyi*, it shows only in the length of stylet and spicules some minor differences.

More than thirty nematode species are known to be associated with rice plant (*Oryza sativa* L.). Of them, *Aphelenchoides besseyi* Christie, 1942, *Ditylenchus angustus* (Butler, 1913), *Hirschmanniella oryzae* (Breda de Haan, 1902), *Heterodera oryzae* Luc & Berdon Brizuela, 1961 and *Meloidogyne graminicola* Golden & Birchfield, 1965 are the most important. The most common nematode on foliage and flowering parts of rice is *Aphelenchoides besseyi*, the „rice white-tip nematode“. It causes the so-called white tip disease. *Aphelenchoides besseyi* is widely prevalent in many (more than thirty) countries causing yield losses up to 17 % (Zhang, 1987), 20 % (Prasad *et al.*, 1987) or 30-40 % (Ichinohe). In India it can cause crop losses up to 45 % (Dwivedi, 1989), or, in Brasil even to 50 % (Da Silva, 1992).

The age of seedlings, placement distances, developmental stages of the nematodes and temperature all influence the attractiveness of rice seedlings to *A. besseyi*. A six-day-old seedling and 30° C temperature are the most favourable, and the basal part of seedling appears to be the main source for release of a possible attractant (Gokta and Mathur, 1988). The nematode can survive for one year inside the rice seeds and 53 days in water under 10° C (Qiu *et al.*, 1991). *Aphelenchoides besseyi* is rather polyphagous and may infect various field crops and ornamental plants, e.g. strawberry, Chili pepper, onion, *Setaria*, *Ficus*, *Polianthes*, *Hibiscus*, etc.

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The white-tip nematode infects rice ectoparasitically in the beginning of rice flowers and hibernates beneath seed glumes as both fourth-stage juveniles and adults (Nandakumar *et al.*, 1975). Once, the nematodes revive and leave the seeds to attack new rice seedlings. Their ectoparasitic feeding on the growing points of rice results whitening or light browning on the upper 3-5 cm of the leaf tips. These become necrotic, twisting include tattered white to brownish leaf tip and distortion of the flag leaf enclosing the panicle.

Materials and methods

In the course of a routine survey, we noticed the symptoms of „white tip“ in some paddies in Dakahlia, Sharkia and Kafr El-Sheikh governorates in the Nile Delta Region in Egypt. The nematodes were extracted, an their morphometric data observed. They were identified, especially based on the works of Allen (1952) and Sanwal (1961), as *Aphelenchoides besseyi*. The rice white-tip nematode is hence recorded for the first time in Egypt.

The rice seed samples were collected at flowering and harvest time. Seeds from nematode infected plants of rice varieties „cvs Sakha 101 and 102“ showing white tip leaf symptoms were collected from paddies and stored at 10° C until use for extraction. The nematodes were extracted by a modified Baermann tray technique followed by Cobb's sieving method. Rice seed samples were soaked for 48 hours at 20° C. The nematodes were concentrated through Cobb's sieves No. 350 mesh. They were killed and fixed in 5 % hot formalin at 50° C. Measurements were made under a compound microscope.

Aphelenchoides besseyi Christie, 1942

Some main morphological characters of the Egyptian population are as follows.

Female. Body slender. Cuticle marked by very fine transverse striae. Lateral field occupying one-fourth of body diameter, and consisting of three bands (with four incisures). Lip region expanded, wider than neck at base of lips. Lips unstriated with hexaradial inner sclerotization. Stylet sharply pointed anteriorly, basal knobs conspicuous. Median bulb oval, well developed. Nerve ring one body width posterior to median bulb. Excretory pore located a little anterior to nerve ring. Oesophageal glands (lobes) extending five body widths behind the median bulb, joining the oesophagus immediately behind this bulb. Ovary relatively short, oocytes not arranged in tandem. Posterior uterine sack slender, 2-3 body widths long. Tail conoid, terminus armed with four mucronate processes.

Male. Tail curvature about 180 degrees when relaxed by gentle heat. Three pairs of ventro-submedial papillae present, of which the anterior pair

Table 1. Measurements of the Egyptian population of *Aphelenchoides besseyi* compared with some main literature data

Measurements	Egyptian population	Christie, 1942	Allen, 1952	Fortuner, 1970
Female				
Length	0.54-0.77 (0.66) mm	0.66-0.75 mm	0.62-0.88 mm	0.57-0.84 mm
Width	15-18 (15.9) μ m	17-22 μ m	-	-
Stylet length	8.5-13 (10.6) μ m	-	10 μ m	10.0-12.5 μ m
Oesophagus length	60-68 (64.1) μ m	64-68 μ m	-	-
Tail length	30-45 (36.7) μ m	36-42 μ m	-	-
a	36-51 (41.5)	32-42	38-58	39-53
b	9.7-12.7 (11.5)	10.2-11.4	9-12	9.2-13.1
b'	4.7-6.3 (5.67)	-	-	4.06-5.77
c	15.4-20.1 (18.0)	17-21	15-20	13.8-20.4
V %	69.2-74.6 (71.7)	68-70	66-72	68.7-73.6
Male				
Length	0.52-0.66 (0.58) mm	0.54-0.62 mm	0.44-0.72 mm	0.53-0.61 mm
Width	15-18 (15.9) μ m	14-17 μ m	-	-
Stylet length	9-12 (9.9) μ m	-	-	10.0-12.5 μ m
Oesophagus length	55-67 (60.6) μ m	63-66 μ m	-	-
Tail length	30-39 (33.3) μ m	34-37 μ m	-	-
Spicules length	15-18 (15.8) μ m	-	-	18-21 μ m
a	33-42 (34.7)	36-39	36-47	41-47
b	8.9-10.6 (9.8)	8.6-8.8	9-11	8.9-10.7
b'	3.8-5.1 (4.3)	-	-	3.6-4.9
c	15.5-22.0 (18.3)	15-17	14-19	16-20

lying adanal. Spicules strong, ventrally curved. Tail terminus similar to that of female.

A comparison between the Egyptian populations and other ones recorded by Christie (1942), Allen (1952) and Fortuner (1970) is presented in Table 1. Measurements revealed that the present specimens of *A. besseyi* correspond well to the previous descriptions. The stylet and spicula were however a little shorter in the Egyptian animals.

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